(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
4 November 2004 (04.11.2004)

PCT

(10) International Publication Number
WO 2004/095134 A3

(51) International Patent Classification[7]: G03F 7/30, 7/00, G11B 7/26

(21) International Application Number: PCT/IB2004/050480

(22) International Filing Date: 22 April 2004 (22.04.2004)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
03101104.2 23 April 2003 (23.04.2003) EP

(71) Applicant *(for all designated States except US)*: **KONINKLIJKE PHILIPS ELECTRONICS N.V.** [NL/NL]; Groenewoudseweg 1, NL-5621 BA Eindhoven (NL).

(72) Inventors; and

(75) Inventors/Applicants *(for US only)*: **NEIJZEN, Jacobus, H., M.** [NL/NL]; c/o Prof. Holstlaan 6, NL-5656 AA Eindhoven (NL). **VAN SANTEN, Helmar** [NL/NL]; c/o Prof. Holstlaan 6, NL-5656 AA Eindhoven (NL).

(74) Agent: **UITTENBOGAARD, Frank**; Prof. Holstlaan 6, NL-5656 AA Eindhoven (NL).

(81) Designated States *(unless otherwise indicated, for every kind of national protection available)*: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.

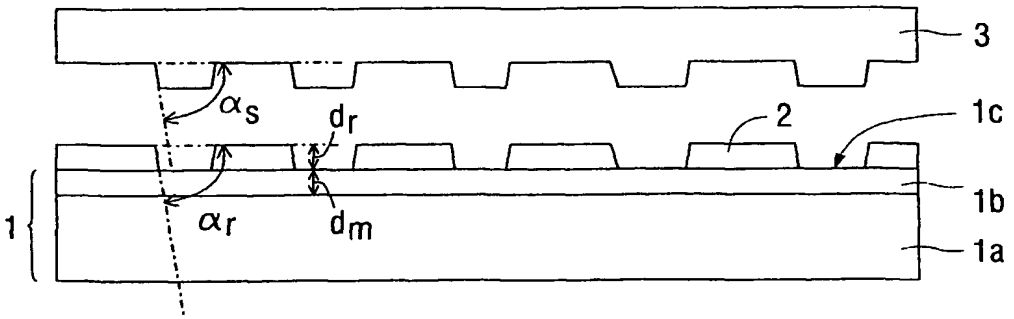
(84) Designated States *(unless otherwise indicated, for every kind of regional protection available)*: ARIPO (BW, GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Declaration under Rule 4.17:

— *as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii)) for the following designations AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, UZ, VC, VN, YU, ZA, ZM, ZW, ARIPO patent (BW, GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PL, PT, RO, SE, SI, SK, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG)*

[Continued on next page]

(54) Title: PHOTOLITHOGRAPHIC PROCESS, STAMPER, USE OF SAID STAMPER AND OPTICAL DATA STORAGE MEDIUM



(57) Abstract: A photolithographic process is described. It comprises the steps of: applying a photoresist layer (2) on a substrate (1), locally exposing the photoresist layer (2) to a radiation source with a suitable wavelength, providing a suitable liquid developer composition on the substrate (1), dissolving an exposed or unexposed region of the photoresist layer (2) with the developer composition, rinsing and drying the photoresist layer (2) thereby interrupting said dissolving step. The substrate (1) has a metallic surface (1c) in contact with the photoresist layer (2) and the photoresist layer (2) has a thickness dr < 100nm. A relatively high photoresist wall steepness is achieved of 70 degrees or more. The process may be used for the production of high density optical data storage media by using a stamper (3) produced with said process.

WO 2004/095134 A3

Published:
— *with international search report*
— *before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments*

(88) Date of publication of the international search report:
20 January 2005

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 G03F7/30 G03F7/00 G11B7/26

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 G03F G11B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)
EPO-Internal, INSPEC, PAJ, IBM-TDB, COMPENDEX

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	NING GU ET AL: "Application of poly(methyl methacrylate) ultrathin resist supported by a flowing subphase method in electron-beam fabrication of a 4 in. high-resolution mask" JOURNAL OF VACUUM SCIENCE & TECHNOLOGY B (MICROELECTRONICS AND NANOMETER STRUCTURES) AIP FOR AMERICAN VACUUM SOC USA, vol. 15, no. 1, 1997, pages 178-179, XP000729009 ISSN: 0734-211X the whole document	1-3

-/--

[X] Further documents are listed in the continuation of box C.

[X] Patent family members are listed in annex.

° Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
5 November 2004	06/12/2004

Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	Haenisch, U

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	KUAN S W J ET AL: "Ultrathin poly(methylmethacrylate) resist films for microlithography" JOURNAL OF VACUUM SCIENCE & TECHNOLOGY B (MICROELECTRONICS PROCESSING AND PHENOMENA) USA, vol. 7, no. 6, 1989, pages 1745-1750, XP000249740 ISSN: 0734-211X the whole document	1-3
X	W. LU ET AL .: "Ultrathin resist films patterning using a synchrotron radiation lthhography system" VACUUM, vol. 48, no. 1, 1997, pages 103-105, XP002304011 the whole document	1,2
X	PATENT ABSTRACTS OF JAPAN vol. 0160, no. 53 (P-1309), 10 February 1992 (1992-02-10) & JP 3 252936 A (HITACHI CHEM CO LTD), 12 November 1991 (1991-11-12).	6-8
Y	abstract & JP 03 252936 A (HITACHI CHEM CO LTD) 12 November 1991 (1991-11-12)	1-5
Y	US 6 200 736 B1 (TAN ZOILO CHENG HO) 13 March 2001 (2001-03-13) cited in the application the whole document	1-5
Y	PATENT ABSTRACTS OF JAPAN vol. 0120, no. 74 (P-674), 9 March 1988 (1988-03-09) & JP 62 212943 A (SEIKO EPSON CORP), 18 September 1987 (1987-09-18) abstract & JP 62 212943 A (SEIKO EPSON CORP) 18 September 1987 (1987-09-18)	1-5
Y	TAN Z C H ET AL: "Potential of DNQ/novolac and chemically amplified resists for 100 nm device generation maskmaking" MICROELECTRONIC ENGINEERING, ELSEVIER PUBLISHERS BV., AMSTERDAM, NL, vol. 57-58, September 2001 (2001-09), pages 531-538, XP004302310 ISSN: 0167-9317 the whole document	1-5

-/--

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	EP 0 698 825 A (AT & T CORP) 28 February 1996 (1996-02-28) the whole document	
A	PATENT ABSTRACTS OF JAPAN vol. 0123, no. 66 (P-765), 30 September 1988 (1988-09-30) & JP 63 117347 A (SEIKO EPSON CORP), 21 May 1988 (1988-05-21) abstract	6-8

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
JP 3252936 A	12-11-1991	NONE	
US 6200736 B1	13-03-2001	US 6107009 A	22-08-2000
		AU 3386599 A	01-11-1999
		CA 2292572 A1	21-10-1999
		EP 0991983 A1	12-04-2000
		JP 2002505766 T	19-02-2002
		WO 9953381 A1	21-10-1999
JP 62212943 A	18-09-1987	NONE	
EP 0698825 A	28-02-1996	EP 0698825 A1	28-02-1996
		JP 8069109 A	12-03-1996
		US 5688634 A	18-11-1997
JP 63117347 A	21-05-1988	NONE	